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MONITORING COASTAL WATER PROPERTIES
AND CIRCULATION FROM ERTS-1

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PROPERTIES AND CIRCULATION FROM ERTS-1
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Report on Significant Results

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SIGNIFICANT RESULTS

Imagery and digital tapes from nine successful ERTS-1 passes over Delaware Bay during different portions of the tidal cycle have been analyzed with special emphasis on turbidity, current circulation, waste disposal plumes and convergent boundaries between different water masses. (NASA-ERTS-1 I.D. Nos. 1024-15073, 1079-15133, 1133-15141, 1187-15140, 1205-15141, 1294-15083, 1349-15134, 1385-15131, 1403-15125, respectively). During ERTS-1 overpasses ground truth was being collected along a total of twelve boat and helicopter transects across the bay, including measurements of Secchi depth, suspended sediment concentration and size, transmissivity, temperature, salinity, and water color.

ERTS-1 image radiance (microdensitometer traces) correlated well with Secchi depth and suspended sediment concentration. While only four concentration levels were extracted from transparencies, up to twice that number were obtained on sediment concentration plots derived from the MSS tapes directly. MSS band 5 seemed to give the best representation of sediment load in the upper one meter of the water column. Color density slicing helped delineate the suspended sediment patterns more clearly and differentiate turbidity levels. Density slicing of all four MSS bands gave an indication of relative sediment concentration as a function of depth, since the four bands penetrate to different depths ranging from several meters to several centimeters, respectively.

Circulation patterns observed by ERTS-1 during different parts of the tidal cycle, agreed well with predicted and measured currents throughout Delaware Bay. During flood tide the suspended sediment as visible from ERTS-1 also correlated well with the depth profile. ERTS-1 imagery is now being used to extend and verify a predictive model for oil slick movement in Delaware Bay.

Convergent shear boundaries between different water masses were observed from ERTS-1, with foam lines containing high concentrations of lead, mercury and other toxic substances. Several varieties of fronts have been seen. Those near the mouth of the bay are associated with the tidal intrusion of shelf water. Fronts in the interior of the bay on the Delaware side appear to be associated with velocity shears induced by differences in bottom topography. In several ERTS-1 frames, waste disposal plumes have been detected 36 miles off Delaware's Atlantic coast.